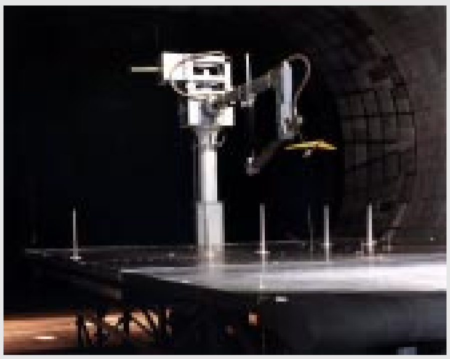
FO OUTLOOK
NASA AMES RESEARCH CENTER

Information for the NASA Ames Aeronautical Test Community

March 21, 2000

GROUND PLANE VALIDATION TEST IN 40 X 80

(ByTom Arledge)



Ground Plane Validation Test model in 40x80 ft Wind Tunnel

This past October, a validation test was completed for a ground plane in the 40 ft. by 80 ft. Wind Tunnel to invest in vertical/short takeoff and landing (V/STOL) hardware and demonstrate world-class testing capabilities for prospective JSF testing. Installation took place October 15 through October 21, testing went through October 28 (62 hours of testing), and hardware removal finished up on November 1.

Ames Research Center has a broad history in V/STOL research and is continuing that research into the next century to pursue the many research opportunities that are on the horizon. One of the latest programs in which Ames is involved is the Joint Strike Fighter Program (JSF), which is developing a multi-role fighter with a version for each branch of the armed services. As an example, the Marine Corps version would be a STOVL replacement for the Harrier.

NASA has been supporting JSF and its immediate predecessors for several years, including large and small-scale wind tunnel tests. Currently JSF is in its Concept Demonstration phase during which the competitors Lockheed Martin and Boeing will fly their proposed aircraft for evaluation. A winner is to be chosen in March 2001 to participate

(Please turn to page 2)

THE LB-435 CALIBRATION TEST CONDUCTED IN THE 11-FT. TWT

(By George D. Rupp and Alan R. Boone)

The LB-435 calibration test program is the second of two currently scheduled calibration tests conducted in the 11-Ft. TWT. The LB-435 and the F-18 tests are the benchmarks for evaluating the 11-Ft. TWT improvements installed during the Unitary modernization project and tested during the recent Integrated Systems Testing.

LB-435 model Angle-of-Attack verification in 11ft TWT

Customer confidence and basic ISO principles dictate that we demonstrate effective control of the test process, instrumentation accuracy and systems dependability used to generate our wind tunnel test data products. The LB-435 is the cornerstone of this effort to attach metrics to the stability and repeatability of our data products. The test plan developed for this calibration test will be re-run on a periodic basis, initially every six months and then on a twelve month interval for the foreseeable future. The reporting of these results to potential customers should increase the level of confidence in our product and will allow the customer to make choices based upon objective evidence. Most of the processes and instrumentation that we use for “Production Testing” will be the same as those used during this calibration test entry. Their variability over time is therefore contained within the test data and may be tracked and reported.

(Please turn to page 6)

SHARC CMT VALIDATION TEST CONTINUED...

(By Mario Perez)

SHARC Model in 40x80 ft. Low-Speed Tunnel

During the SHARC CMT Validation Test, performed last November (November 15, 1999 through Nov. 20, 1999) in the NASA-Ames 40' x 80' low-speed wind tunnel, The Boeing Company (Phantom Works) tested a hyperelastic structure on the Subsonic High Alpha Research Concept (SHARC) model. Boeing researchers modified an aerodynamic control surface with Continuous Moldline Technology (CMT) materials to further develop their design concept and design methodology. CMT is used to seal gaps between fixed airframe structure and an actuated control surface. This technology provides a passive aerodynamic seal around the perimeter and hinge.

Integrating CMT on a control surface is one of several applications of this unique technology. The CMT shape-change capability offers designers of advanced aircraft many benefits. Through the utilization of CMT, aircraft structures can transform shape in flight to increase system effectiveness and improve aircraft concept design synergy. This modification allowed a flaperon to travel through the desired deflection angles and provided a continuous load carrying aerodynamic surface. As the device is actuated, these transitions provide a smooth splined 'S' shape surface between the deflected and fixed surface.

The SHARC CMT Lift & Control program matured the CMT continuous control surface application to a Technology Readiness Level (TRL) of 4. Furthermore, during this test program, Boeing researchers gained valuable insight with respect to the design, analysis, and airframe integration of CMT hyperelastic structures. The success of this program has paved the way for future technology development efforts; Technology Demonstration (TRL 5-6) of the continuous control surface CMT concept is the goal of the follow-on F-15 CMT Rudder Flight Test program.

GROUND PLANE VALIDATION TEST IN 40 X 80... *(Continued from page 1)*

in the 80-month Engineering and Manufacturing Development phase (EMD). Hundreds of hours of testing will be necessary in this phase and NASA Ames is preparing to be part of it.

Efficient V/STOL testing needs a single facility that can meet several key testing requirements, such as having both low and medium speed capabilities, eliminating recirculating flow fields, and minimizing the boundary layer. Low speeds are needed for takeoff and landing and medium speeds for the transition into conventional flight.

One of the most important aspects of V/STOL aircraft is the jet-induced aerodynamics close to the ground. Both in-ground-effect (IGE) and out-of-ground-effect (OGE) testing are necessary. Typically, low-speed/IGE testing and medium-speed/OGE testing have to be done in separate facilities. A facility that can do both would be a timesaving advantage. Typically, this testing is done at 5% to 20% scale and requires a high-pressure air source for jet simulation.

In V/STOL testing, it is not just the model that is scrutinized, but also the surrounding flow field it creates. At low speeds, tunnel interference can cause the jet flow to roll back on the model. To alleviate this recirculation problem, even though the models are relatively small, it is good practice to use a larger tunnel. Since a lot of the testing takes place with the model close to the ground, the boundary layer structure is very important. One method is to use an elevated ground plane to keep testing out of the tunnel boundary layer. Although a boundary layer will grow on the elevated ground plane as well, it is smaller and the elevated ground plane provides an easier place to implement controls such as blowing, suction, trip strips, etc. Using this ideal strategy for a single facility, Ames wind tunnel personnel set out to develop the necessary hardware for this area of V/STOL testing.

Although most of the hardware existed from previous testing, a major effort went into modifying the elevated ground plane (26' x 26' x 8'), whose only prior use had been for wind-off hover testing in the 80x120 Test Section. An 11-ft. by 26-ft. extension was added, along with an airfoil leading edge designed to smooth out the flow and minimize the ground plane's boundary layer. A structural lattice was designed to withstand air speeds of 100 knots and anchor the ground plane to the tunnel's acoustic lining.

(Continued on page 4)

93RD MEETING OF THE SUPERSONIC TUNNEL ASSOCIATION INTERNATIONAL

(By Phil Stich)

NASA Ames will be hosting the 93rd semi-annual meeting of the Supersonic Tunnel Association International on April 30 through May 2, 2000. The Supersonic Tunnel Association (STA) was formed in 1954 to bring together engineers and scientists working in the technology of high-speed wind tunnel testing. The primary purpose of the organization is the sharing of information concerning facility operation, instrumentation and test techniques. In 1996, the STA was renamed the Supersonic Tunnel Association, International (STAI) to reflect the importance it places on it's worldwide representation. The STAI is currently made up of 41 member organizations that represent government, industry, and academia in fourteen countries.

NASA Ames has been an active member of this organization since 1962 (18th meeting) and has hosted the meeting twice before, in September 1966 and in March 1980 (See group photo of 1980 meeting). Mr. Lado Muhlstein was the NASA Ames representative to the STAI for many years until his recent retirement. Mr. Mike George currently fills this position.

The members of the Supersonic Tunnel Association during the 53rd Semiannual Meeting, March 26-28, 1980.

STAI meetings consist of technical sessions, tours of the host organization's test facilities and social functions. The format provides an excellent opportunity for interaction with colleagues and the sharing of operational problems, solutions and developments. The timing of the 93rd meeting is fortuitous as we can show the outstanding improvements that have been made to the Unitary 11' Transonic Tunnel over the last 5 years.

AMERICA TRUE CHALLENGER FOR THE AMERICA'S CUP 2000 RACE

(By Jules Gustie)

In January of 1999, several keel designs were tested for America True at the Ames 12-foot Pressure Wind Tunnel. America True is the syndicate, under sponsorship of the San Francisco Yacht Club, that has recently competed in the America's Cup 2000 race.

The primary objective of the test was to determine and optimize lift and drag of various hull components. A 31% scale model of hull appendages was mounted inverted on the image plane in the 12-foot PWT. Full scale Reynolds number can be obtained at 6 atmospheres with this size model. To more accurately simulate water, flow turbulence was increased using an auxiliary screen. The configurations were tested at both upwind and downwind speeds in heeled and unhealed attitudes. Flow visualization using fluorescent oil was used to check flow patterns over the appendages surfaces. This was the first fee test be conducted at the 12-foot PWT.

The test was conducted during the first week in January, 1999 however measurement anomalies occurred due to the non-typical balance mounting support and the extreme accuracy that was required of the balance. Analysis during the second week in January showed that undesirable flows about the balance and temperature variations were causing the measurement problems. The test was completed the third week in January under more stabilized conditions that resulted in more consistent data.

The America's Cup is the world's oldest sporting trophy. In 1848, Queen Victoria authorized the creation of a "One Hundred Guinea Cup" of solid silver (134 oz), for a yacht race "open to all nations." The only challenger was a New York shipbuilder who designed the two-masted schooner "America." In 1851 the first race was held south of England around the Isle of Wright. The "America" raced against 16 British yachts. At the finish of the 58-mile race all were surprised by the yacht that was leading and won. This prompted the often-quoted remark by Queen Victoria. "Who is first?" the Queen asked. "America is first" she was told. "Who is second?" the Queen asked. The reply still echoes - "Your Majesty, there is no second."

Since that time, there have been 29 challenges for the cup. The cup was held by the U.S. for 132 years but was won in 1983 by Australia II. The cup was returned to the U.S. in the next race in 1987 by the Stars and Stripes of the San Diego Yacht Club. The yacht Black Magic of the Royal New Zealand Yacht Club won the Cup in 1995.

The America's Cup 2000 match races were held in the Hauraki Gulf east of Auckland, New Zealand. There were 18 challengers from 10 countries that competed for the Cup starting in October 1999. The American challengers were America True of the San Francisco Yacht Club, America One of the St. Francis Yacht Club, Young America of the New York Yacht Club, Team Dennis Conner of the Cortes Racing Assoc. (San Diego) and Aloha Racing of the Waikiki Yacht Club. America True made its mark in the three rounds of the Louis Vuitton Cup challenger trials, but unfortunately was not able to sail past the challenger trials to the win the America's Cup 2000.

REAL-TIME WALL INTERFERENCE CALCULATION SYSTEM- Development Status January 2000

(By Norbert Ulbrich)

During the past two years there has been significant progress in the development of the real-time Wall Interference Correction System (WICS) for the 12ft Pressure Wind Tunnel (PWT) and the Unitary 11ft Wind Tunnel. Major development goals related to performance, accuracy, reliability, and productivity of the system were achieved.

WICS was applied to a wide variety of wind tunnel models that included successful wall interference corrections for more than 150,000 datapoints. Experience showed that the wall pressure measurement instrumentation and the real-time software were very reliable. A series of fullspan and semispan model tests conducted by Boeing Long Beach in the 12ft PWT tested the system under very demanding conditions. During these tests it was demonstrated that the accuracy of the computed corrections is consistently good as long as the wall pressure measurement instrumentation is not influenced by significant temperature changes in the test section. Wind tunnel operators paid close attention to this problem to ensure that customers received the best possible set of wall interference corrections from WICS.

New capabilities for second order wall interference corrections and calibration software were recently added to the WICS software. These capabilities allow the user to assess the impact of wall interference effects on test data in greater detail and significantly reduces the time that is required to process a calibration of wall pressure ports.

WICS is intended to give expert assistance test engineers and customers in the field of wind tunnel wall interference corrections. Detailed documentation is also available as a ready reference for the application of WICS to a wind tunnel test. Documentation consists of a "Theory Guide", a "User Manual", and a "Software Manual". The "Theory Guide" was published as a NASA Contractor Report. Training material that was used during two WICS training classes in November 1998 is also available.

Preparations to implement WICS in the 11ft Transonic Wind Tunnel (TWT) have been underway since July 1999. The first phase completed last December, is the development of a 3D panel method code that is capable of modeling the slotted wall boundary condition of the 11ft TWT test section. The second phase currently underway implements the modification of the real-time software and final installation/calibration of wall pressure ports in the 11ft TWT test section. The new wall pressure measurement instrumentation system is significantly less sensitive to temperature changes in the test section making the measurement of wall pressures more accurate.

A recent collaboration between Ames and Langley discussed the plan to implement WICS in the National Transonic Facility (NTF) and other wind tunnels. A key element of this meeting was to review the possibility of making WICS the standard wall interference correction technique for all Ames and Langley Wind Tunnels.

The successful implementation of WICS in the 12ft PWT involved a committed staff that made sure that problems were solved as soon as they occurred. This experience and dedication has allowed the expansion of similar systems in the 11ft TWT and in the NTF. The next phase of implementation will include the application of C++ object-oriented programming techniques to the WICS software package as well as the development of a standardized, easily maintained software package for all Wind Tunnels.

GROUND PLANE VALIDATION TEST IN 40 X 80...

(Continued from page 2)

A new base was built for the Telescoping Strut Model Support (TSMS) to attach it to the 40 x 80 T-frame so it could perform height and roll sweeps up to 100 knots and perform pitch sweeps up to 250 knots. The TSMS is a large telescoping strut on which is mounted the model support arm. The model support arm extends out to suspend the model over the center of the ground plane. The TSMS provides the height sweeps for the model above the ground plane and the model support arm pitches and rolls the model. Controls for these systems were integrated with the 40x80 model support systems. A simple wing was mounted on an internal balance and the resulting forces and moments were used as an indication of general flow quality.

The instrumentation and data system utilized hundreds of total and static pressure ports and twelve boundary layer rakes ranging in height from 4 inches to 4 feet on and around the ground plane to document the flow over the ground plane. Tunnel wall pressures were taken to compare ground plane blockage against tunnel empty flow and a five-hole probe was mounted on the model support to measure flow velocity and direction at various heights. Two sonic sensors were used to measure the tunnel wind speed. A LabVIEW-based system adapted specifically for use in the 40 x 80 was successfully implemented for data acquisition.

A major objective of this test was to document the flow quality over the ground plane and determine any needed improvements for V/STOL testing. Data from the pressure rakes defined the boundary layer structure to ensure that the elevated ground plane did not adversely affect tunnel flow quality, induce flow angularity or create non-uniformity. All of these effects could change the flow over the model enough to adversely alter test results. Together, the pressure rakes and wing model supplied information to accurately assess these flow effects and implement any corrective changes.

(Continued on page 7)

PREPARATION FOR WIND TURBINE EXPERIMENT UNDERWAY!

(By Bob Kufeld)

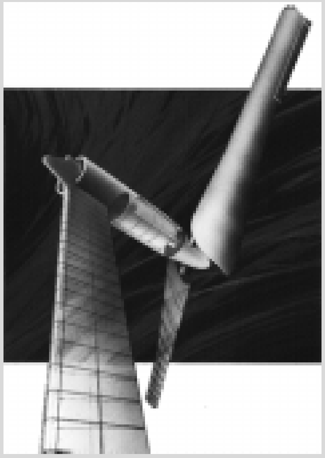
No, that is not Don Quixote jousting with windmills in the 80x120 test section…. it is the personnel from the National Renewable Energy Laboratory (NREL) and the 80x120' operations test team preparing for the Unsteady Aerodynamics Wind Turbine Experiment due to begin in early February. NREL is under contract with the Department of Energy, which is based near Golden, Colorado, to perform research studies with various types of wind turbines. The "Unsteady Aerodynamics Research Turbine" installed in the test section was originally manufactured by Grumman Aerospace Inc. and extensively modified and tested by NREL over the past 10 years. The turbine can be fitted with three blades or two (we are using two) and has been instrumented by NREL with 155 pressure ports, strain gages, accelerometers and position encoders. This highly instrumented turbine will generate valuable data for evaluating complex aerodynamic characteristics, structural loading, and power performance that wind turbines experience in their typical operating environment.

Turbine Wake Experiment #1 in 80x120 ft. Wind Tunnel

NREL has tested various configurations of this research wind turbine outdoors in atmospheric turbulence since 1989. One key objective in past testing is the collection of aerodynamic data characterizing the steady and unsteady aerodynamic response of a rotating airfoil. The resulting design improvements in wind turbines enabled the wind turbine industry to build more efficient and longer lasting wind turbines. In addition, NREL uses outdoor testing to document the highly turbulent nature of wind and shear inflow conditions seen in typical wind turbine operations. It is this complex inflow that makes it difficult to separate unsteady aerodynamic response of the rotating blade from those of the unpredictable wind environment.

Pictures from NREL Home Site: Http://www.nrel.gov/wind/

Modified Grumman turbine is used for steady and unsdeady aerodynamics testing



A new generation of Wind Turbines

The unique capabilities of both the NFAC and the Rotorcraft Aeromechanics Branch (Code ARA) are both ideal for understanding and developing the solution to the turbine's unsteady aerodynamic problems. Testing in the steady flow of the 80x120' WT will allow researchers to isolate and characterize specific dynamic stall responses and 3-D rotation effects under benign steady-state operating conditions. Code ARA is assisting NREL with test planning and the application of their highly complex rotorcraft CFD codes that allows them to accurately model the wind turbine aerodynamics.

During this tunnel entry, the wind turbine test will "fly" between 10 and 50 knots in various configurations. The research wind turbine is equipped for quick configuration changes that include upwind and downwind orientation, rigid or teetering hubs, various pitch and coning angles, and different tips. For this test, NREL plans to test three different turbine tips; the first has a port to release smoke for flow visualization, the second has an end plate to reduce the 3-D effects of the tip, and the third has a one-meter blade extension.

MARKETING WIND TUNNELS *(By John Allmen)*

"…customers become an effective marketing tool."

Our marketing plan is focusing on three major elements. The first is the availability of our facilities; the second is servicing our traditional customers within the "close-knit" aeronautics community, and the third is tapping into the broader market place. The most important element of our marketing strategy is maintaining the availability of our wind tunnels by completing modifications and repairs with minimum down time. Our wind tunnels cost, in round numbers, about $5,000 per occupancy hour to support our organization. If the facility is down for three weeks, we have lost (on an 8 hour a day basis) $600,000 of income. This income is in addition to any construction/repair costs. History has shown that when our facilities are down for an extended period of time, our customers go elsewhere.

Our traditional customers continue to be crucial to our success because they purchase larger blocks of testing time giving a greater return on the investment of resources spent. In addition, because wind tunnel testing is their profession, they routinely express the highest expectations for the quality and efficiency of our product.

(Continued on page 6)

THE LB-435 CALIBRATION TEST CONDUCTED IN THE 11-FT. TWT... *(Continued from page 1)*

In addition to measuring the stability and repeatability of our test data, this test also provides a means of measuring our test productivity and efficiency in completing normal testing tasks. Metrics describing test installation time, removal time, and other normal tasks may be tracked and compiled for customer use in planning tests.

The LB-435 wind tunnel model is a four-ft. wing span generic commercial transport having a wing leading edge sweep of 35°. It has been used in the past at the 11-Ft. TWT as a calibration model and as a standard to assess the effects of facility modifications.

The LB-435 test article instrumentation for this test will consist of a 2.0 inch MK-XXIXA Task balance, a QA2000 tilt sensor and four cavity pressures. The wing is instrumented with static pressures at several lateral stations. Wing surface pressure data will not be acquired during this test because its focus is to obtain accurate balance force, moment and angle-of-attack data.

To facilitate data repeatability and accuracy, new wing root-to-body fairings have been fabricated. Previously these fairing were duplicated with the use of body filler and red wax.

This is the first wind tunnel model to be tested on the Rear Sting Support since its mechanical rebuild and the installation of its position control hardware.

The LB-435 test program focuses on four primary test objectives for this test program. The first goal is to complete the control system tuning of the Sting Model Support System (SMSS). The second is to establish a standard LB-435 test plan that will be used as a “Process Control” measure for the 11-Ft. TWT test processes. The third is to establish an 11-Ft. TWT test database of LB-435 aerodynamic force and moment data for use in establishing statistical process control of our testing processes. The fourth is to measure flow angle for the LB-435 test article.

The LB-435 test Mach number range is 0.20 to 0.90. Data repeatability runs are at Mach numbers 0.80 and 0.82. The angle-of-attack range for aerodynamic phase of the test is from -4.0° to 5.0° at 0.50° increments. The SMSS tuning tests have up to +15° angle-of attack and ±10° of sideslip. Tunnel total pressure ranges from one half atmosphere to 4600 psfa in four discreet settings. The maximum dynamic pressure for this test is 1430 psfa.

MARKETING WIND TUNNELS... *(Continued from page 5)*

“...every one of us is a marketing expert.”

A key element of marketing to our traditional customers is with the speed and quality of our service. Customers want to utilize our facilities as rapidly and efficiently as possible. They want to experience an organization that “has their act together” with everything running well and no delays. To meet this need, tunnels have to be up and running before the start of every shift, and ready to go when the customer walks in the door each morning. With this scenario they obtain the greatest amount of correct data in the shortest possible time. With each testing experience, customers become an effective marketing tool.

The second strategy is to capitalize on the “close knit” aspects of our traditional customers who communicate with each other regularly through professional friendships and organizations. Their open communication includes the status of facilities around the world and the quality and efficiency of wind tunnel services they use. To this end, every test we perform is an “immediate” marketing broadcast to all of our major customers. Both positive and negative test experiences have a significant impact on how others view us as a wind tunnel service provider. From this standpoint, every one of us is a marketing expert in each of our own skill areas. Every one of us has in our hands the ability to sell our capabilities.

A third strategy is to market to the broader customer base that in the past has been deferred from NASA tunnels. This client base includes, wind turbines, signs, automobiles, trucks, boats, buildings, amusement park structures, sports activities, and others. Typically these customers have a very focused test scope that requires fewer occupancy hours. These customers become a key fill-in element to keep our facilities occupied and productive between larger tests. Our goal with this customer base is to be highly productive by tailoring and modifying our typical research and development support into a focused production team that supports a routine access to the facility.

In summary it is important to note three important elements of our marketing. The first is facility availability, keeping our tunnels up and running to support our customer base. The second is that each and every person on our team is a marketing expert with a significant influence on repeat business. The third is the ability to service market sectors with the rapid turnaround of smaller test programs.

GROUND PLANE VALIDATION TEST IN 40 X 80

(Continued from page 4)

Part of proving world-class V/STOL capability in the 40 x 80 is demonstrating productivity. Two major components of productivity for this type of testing are conducting both hover/low speed testing and transition/medium speed testing in the same facility and improving model support efficiency. The 40 x 80 has the speed range, but getting the model completely out of ground effects for transition and forward flight means removing the ground plane between the two phases of testing. Developing an efficient technique for removing the ground plane while leaving the model installed became a crucial effort for the validation test. From a controls perspective, any increase in height, pitch, or roll sweep rates, as well as automating these functions, will increase productivity.

Starting in front, clockwise: *Ken Kono, Craig Hange, Ron York, Mario Perez, Tom Arledge, Paul Askins, Joe Paz, Jason Brown, Garrett Nakashiki, Frank Rosal, Jeff Gilman, Tim Naumowicz, Martin Campbell, Kevin Christy, Dennis Schaumburg, Mike Jones, Mark Buchholz, Eddie Nebre, Mike Lopez, Maurice Lopez, Doug Wardwell, Ruben Torrecampo, Xin Xin Nee, Leon Quintela.*

Not pictured: *Ed Anstey, John Birk, Garry Buob, Vick Ellescas, Kevin Gaynor, Phil Luan, Steve Nance, Robert Scott, Art Silva, Bruce Storms, Patti Whittaker, Pete Zell.*

To meet hover, transition and control productivity objectives and to gain general experience with the new systems, a run matrix was set up to incorporate different areas of a V/STOL test envelope. The run matrix consisted of pitch, roll, and height sweeps with the five-hole probe and wing, as well as various pressure rake configurations. Tunnel speeds ranged from 5 to 100 knots with the ground plane in place and 15 to 250 knots with the ground plane removed. Data with the ground plane in was repeated with the ground plane out for comparison. Every opportunity was taken to work flow visualization into the matrix. Pigmented oil drops and tufting were placed on the ground plane. At low speeds, a smoke wand was used to document the flow over and around the ground plane and model.

The Ground Plane Validation Test was quite successful; all test objectives were met, including the identification of possible areas for improving for future testing. The ground plane and TSMS performed well in their required range of 5 to 100 knots. The TSMS held steady for most of the high speed running above 100 knots, with a slight oscillation of the model support arm at 250 knots. Although this problem may not be an issue with a real model blowing jets, minor stiffening of the model support arm would eliminate it. Review of pressure data shows that the boundary layer thickness on the ground plane is relatively small, with some dependence on tunnel velocity. A classic solution here is to add a transition grit strip to ensure a more consistent boundary layer over the speed range. The blockage correction for the elevated ground plane in the tunnel is minimal with no adverse flow angularity. Flow visualization showed steady flow over the ground plane with a small anomaly of lateral flow isolated at the side edges of the ground plane with no apparent affect on flow over the model. If necessary, edge flow plates could be mounted on the side of the ground plane to prevent airflow from underneath. Overall, in the required velocity range of 15 to 250 knots, the flow quality was good.

FO OUTLOOK

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Although not a test objective in the beginning, there was some investigation into ways to make data acquisition more efficient. Sample duration studies were made and time history data was taken as the model moved through height sweeps. This application has good potential for dramatically reducing run time.

The ground plane removal between the hover and transition flight testing was a major success. Initial estimates were up to two shifts for removal, but the actual time was approximately 3-1/2 hours - less than half a shift! The leading edge extension was removed first with the main ground plane removed in two phases. The floor attachment hardware was designed for easy removal with the ground plane. Ground plane removal was accomplished without having to disconnect or remove the model. After cleanup and an inspection of the test section, we were ready to make the OGE runs.

The successful completion of the Ground Plane Validation Test has shown that the 40 x 80 is an excellent, productive facility for V/STOL testing. Marketing to attract customers will include a detailed report to be made available to both JSF competitors as well as anyone else wanting to do this type of testing. An inflow of customers using this facility will allow us to make continued improvements in this unique capability. By developing and maintaining a world-class facility, Ames can continue to support the aeronautics community in V/STOL, programs like JSF, and be better prepared for future applications for the 40 ft. by 80 ft. Wind Tunnel.

Employee of the Month Awards

Mike Coleman

For his responsiveness to customer needs and his creativeness in using the CM database to respond to customer needs, Mike Coleman is a Civil Servant of the Month, for the month of January. Mike is a coop student assigned to the NFAC archive area and works independently, maintaining the documentation at the facility. His knowledge of the archive system and database enable him to manipulate the system for very in-depth searches. He is a leader in reorganizing the system so that documentation is readily accessible. He services both facility and test engineers at the site. Specifically, Mike was requested to find the original specification by which the current NFAC fan blades were procured. Although unsuccessful in finding this important document in the archives, his support, responsiveness, creativity in generating search criteria, and diligence did unearth three volumes of related material, including a volume from which the spec appears to be missing. The documents were found on real-time basis.

David Gilmore

David Gilmore was originally hired as a member of the verification staff. He quickly became a knowledgeable applications programmer on SDS and has also executed several tests on NPRIME. His dedication, tenacity and verification programmers "nit picky" approach made it possible for all test software to not only be ready on, or before, their due date, but with improved requirements. These tests included the very large 11-Foot IST and numerous 12-Foot PWT test. When not the assigned programmer, he fulfilled his role as the verification programmer. At the same time David assisted in the training of another programmer on SDS a d is also updating the SVS software to reflect the changes in the latest version of the Equations Manual. David's dedication to the tasks assigned and inquisitive and positive attitude is highly regarded by everyone. He has unquestionably contributed to the FOI Division, and for this is awarded an Employee of the Month honor for the month of January.

Howard Clark

Howard Clark has once again used his creative genius to develop a time saving tool for wind tunnel instrumentation activities. Built one evening on swing shift, this device makes it much easier to leak check the TWIC wall pressures. It cuts between 1/3 and 1/2 the time off the process and improves the accuracy. In addition to these rewards, there is also a safety benefit to this in that the Instrument Technician will no longer need to try to hold with their hands a tube of other device up to the wall. This action causes a great deal of repetitive stress to the fingers, hands, wrists, and arms of the technician doing the job. For his hard work and dedication Howard Clark is given an Employee of the Month Award for January 2000.

Precioso Gabrillo

Precioso Gabrillo, who was originally hired as a member of the verification staff, quickly became a knowledgeable applications programmer on both SDS and NPRME. His dedication and tenacity has made it possible for all test software to be ready on, or before, their due dates. These tests included the very large 11-Foot IST and numerous 12-Foot PWT test. When not the assigned programmer, he fulfilled his role as the verification programmer. At the same time Precioso assisted in the training of another programmer on NPRIME and is currently training a new SDS programmer. Although Precioso may be the "new applications programmer on the block", his enthusiasm, dedication to the tasks assigned, and positive attitude is highly regarded by everyone. And for this effort he has received an Employee of the Month Award for January 2000.